WHAT IS CLAIMED IS:

1. A pressure sensing device, comprising:

a semiconductor housing structure having an opening defined therein, said opening having a perimeter;

a thin semiconductor membrane covering the opening so as to define an enclosed cavity within the housing structure, said membrane defining a pressure sensing region within the perimeter; and

a ferromagnetic semiconductor Hall bar gage structure positioned proximal at least a portion of the perimeter of the pressure sensing region;

wherein the Hall bar gage structure produces a signal responsive to a deflection of the membrane in said pressure sensing region due to a pressure difference between the interior of the cavity and the exterior of the cavity, said signal being proportional to the pressure difference.

2. The device of claim 1, wherein the membrane includes one of GaAs and GaN.

3. The device of claim 1, wherein the Hall bar gage structure includes one of Mn doped GaAs and Mn doped GaN.

4. The device of claim 1, wherein the housing structure includes one or more of GaAs, GaN, and Si.

5. The device of claim 1, wherein the pressure sensing region of the membrane is substantially circular.

6. The device of claim 1, wherein the pressure sensing region of the membrane is substantially rectangular.

7. The device of claim 6, further including a second ferromagnetic semiconductor Hall bar gage structure positioned on the membrane away from the pressure sensing region, wherein said second Hall bar gage provides a reference signal.

8. The device of claim 7, wherein the signal and the reference signal are processed to determine one or more parameters associated with the pressure difference on the membrane in the sensing region.

9. A method of producing a ferromagnetic semiconductor-based pressure sensor, comprising:

providing a substrate;

forming an epitaxial heterostructure comprising two or more layers on the substrate;

forming a cavity in the substrate such that the cavity is exposed to a portion of a first one of said two or more layers of the epitaxial heterostructure, the exposed portion of the first layer defining a sensing region having a perimeter;

sealing the cavity;

patterning the layer adjacent the first layer so as to form a Hall bar gage structure proximal the perimeter of the sensing region and so as to expose the sensing region of the first layer to the atmosphere;

wherein the Hall bar gage structure produces a signal responsive to a deflection of the first layer in said pressure sensing region due to a pressure difference between the interior of the cavity and the exterior of the cavity, said signal being proportional to the pressure difference.

10. The method of claim 9, wherein the substrate is one of a GaAs substrate and a GaN substrate.

11. The method of claim 9, wherein the heterostructure includes GaAs in the first layer and Mn doped GaAs in the adjacent layer.

12. The method of claim 11, wherein the heterostructure further includes AlGaAs in a second layer between the first layer and the substrate, said second layer serving as an etch stop during the step of forming the cavity.

13. The method of claim 9, wherein the heterostructure includes GaN in the first layer and Mn doped GaN in the adjacent layer.

14. The method of claim 9, wherein the sensing region is substantially circular.

15. The method of claim 9, wherein the sensing region is substantially rectangular.

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16. The method of claim 9, wherein sealing includes bonding the substrate to a second substrate so as to seal the cavity from the atmosphere.

17. The method of claim 9, wherein the epitaxial heterostructure is formed using molecular beam epitaxy.

18. A ferromagnetic semiconductor-based read head sensor configured to detect magnetic domain orientations in a magnetic recording medium having a plurality of domains, each domain having a magnetization, the sensor comprising:

a substrate defining a plane;

a ferromagnetic semiconductor epilayer formed on said substrate, said epilayer having a cubic hard axis; and

first and second read current contacts, each contact coupled proximal an end of the epilayer, said contacts being configured to provide an electrical current flow along the hard axis; and

one or more read probes, in electrical contact with the epilayer, configured to detect transverse magnetic resistance in the epilayer;

wherein application of an in-plane magnetic field, non-aligned with the cubic hard axis, produces a transition in the transverse magnetic resistance of the epilayer, and wherein the magnetization of each domain produces a magnetic field having a component non-aligned with the cubic hard axis when the read head is positioned proximal thereto.

19. The sensor of claim 18, wherein the epilayer is substantially elongated and oriented along the cubic hard axis.

20. The sensor of claim 18, wherein the substrate is one of a GaAs substrate and a GaN substrate, and wherein the epilayer includes one of a Mn doped GaAs layer and a Mn doped GaN layer.

21. The sensor of claim 18, wherein the epilayer includes a type III-V semiconductor material.

22. The sensor of claim 18, further including at least one electric coil proximal the substrate and epilayer for generating a saturation magnetic field of desired orientation and magnitude within the epilayer.

23. A method of detecting changes in magnetic domain orientations in a magnetic recording medium using a ferromagnetic semiconductor-based read head sensor, the method comprising:

positioning a read head sensor proximal a magnetic recording medium having a plurality of domains, each domain having a magnetization, wherein the read head sensor includes a ferromagnetic semiconductor epilayer structure defining a plane and having a cubic hard axis;

moving the read head position relative to the domains in a sequential order; and

detecting changes in the transverse magnetic resistance of the epilayer structure;

wherein application of an in-plane magnetic field, non-aligned with the cubic hard axis, produces a transition in the transverse magnetic resistance of the epilayer, and wherein the magnetization of each domain produces a magnetic field having a component non-aligned with the cubic hard axis when the read head is positioned proximal thereto.

24. The method of claim 23, wherein the substrate is one of a GaAs substrate and a GaN substrate, and wherein the epilayer includes one of a Mn doped GaAs layer and a Mn doped GaN layer.

25. The method of claim 23, wherein the magnetic recording medium is substantially circular, and wherein moving includes rotating the magnetic recording medium.

26. The method of claim 23, wherein the epilayer includes a type III-V semiconductor material.

27. The method of claim 23, further including generating a saturation magnetic field of desired orientation and magnitude within the epilayer using at least one electric coil positioned proximal the substrate and epilayer.